

REMARKS

Claims 1-15 are pending in the present application. Claims 1-5 have been amended. Claims 7-15 have been presented herewith.

Priority Under 35 U.S.C. 119

Applicant notes the Examiner's acknowledgment of the Claim for Priority under 35 U.S.C. 119, and receipt of the certified copy of the priority document.

Drawings

Applicant notes the Examiner's acceptance of the drawings as filed along with the present application on January 21, 2004.

Claim Rejections-35 U.S.C. 103

Claims 1-3 and 6 have been rejected under 35 U.S.C. 103(a) as being unpatentable over the Park et al. reference (U.S. Patent No. 6,465,866) in view of the Noguchi reference (U.S. Patent No. 6,548,866). This rejection, insofar as it may pertain to the presently pending claims, is traversed for the following reasons.

The method for manufacturing a semiconductor device of claim 1 includes in combination a step of forming a groove; "a step of forming by wet oxidation a first thermal oxide film extending from over a bottom surface of the groove to an intermediate point on a sidewall of the groove, the intermediate point being at a depth

within a range of 100nm to 200nm from the main surface of the semiconductor substrate"; and "a step of forming by dry oxidation a second thermal oxide film extending from the intermediate point on the sidewall of the groove to over the main surface of the semiconductor substrate". Applicant respectfully submits that these features would not have been obvious in view of the relied upon prior art.

As described in column 4, lines 62-65 of the Park et al. reference and as illustrated in Figs. 4 and 5E, liner 50 is recessed from the surface of semiconductor substrate 40 outside the trench, preferably by a depth of about 0 to 500Å (0-50nm).

In contrast, the step of forming by wet oxidation a first thermal oxide film of claim 1 features that the intermediate point, to which a first thermal oxide film extends on the sidewall of the groove, is at a depth within a range of 100 nm to 200 nm from the main surface of the semiconductor substrate. As such, the trench top region in the method for manufacturing a semiconductor device of claim 1 is surely exposed, so that the subsequently formed second thermal oxide film may be surely formed at the top edge of the trench by dry oxidation. The Park et al. reference as relied upon by the Examiner does not disclose these advantageous features. The Noguchi reference as secondarily relied upon by the Examiner also fails to disclose these features. Applicant therefore respectfully submits that the method for manufacturing a semiconductor device of claim 1 would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, and that this rejection, insofar as it may pertain to claims 1-3 and 6, is improper for at least these reasons.

Claim 4 has been rejected under 35 U.S.C. 103(a) as being unpatentable over the Park et al. reference and the Noguchi reference, in further view of the Kim et al. reference (U.S. Patent Application Publication No. 2002/0117731). Also, claim 5 has been rejected under 35 U.S.C. 103(a) as being unpatentable over the Park et al. reference and the Noguchi reference, in further view of the Chang et al. reference (U.S. Patent No. 6,566,224). Applicant respectfully submits that the above noted secondary references as relied upon by the Examiner do not overcome the above noted deficiencies of the primarily relied upon prior art. Accordingly, Applicant respectfully submits that claims 4 and 5 would not have been obvious in view of the prior art as relied upon by the Examiner for at least these reasons.

Claims 7-15

The method of manufacturing a semiconductor device of claim 7 includes in combination forming a groove; "forming a first thermal oxide on a bottom of the groove and extending up to an intermediate point on a sidewall of the groove, by wet oxidation"; "forming a second thermal oxide on the surface of the semiconductor substrate and extending down to the intermediate point on the sidewall of the groove, by dry oxidation"; and "forming an insulating film to entirely bury the groove, after said forming a first thermal oxide and said forming a second thermal oxide".

It is presumed that oxide film 52 as deposited within the grooves as shown in Fig. 5D of the Park et al. reference would be interpreted by the Examiner as the

insulating film of claim 7. However, as may be readily understood in view of Figs. 5E and 5F of the Park et al. reference, oxide film 52 which is buried within the trenches is formed prior to gate oxide film 54 (interpreted by the Examiner as the second thermal oxide). Accordingly, the Park et al reference does not disclose or suggest forming an insulating film to entirely bury a groove, after forming a first thermal oxide and forming a second thermal oxide, as would be necessary to meet the features of claim 7. The secondary prior art references as specifically relied upon by the Examiner do not overcome the above noted deficiency. Applicant therefore respectfully submits that claims 7-15 distinguish over and would not have been obvious in view of the prior art as relied upon by the Examiner taken singularly or together, for at least these reasons. Moreover, the prior art as relied upon by the Examiner fails to disclose or suggest the features of claim 8, wherein the intermediate point is at a depth within a range of 100nm to 200nm from the surface of the semiconductor substrate.

Conclusion

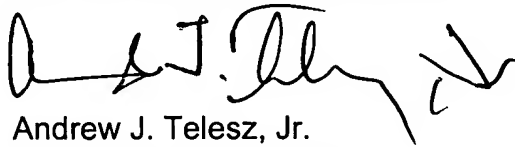
The Examiner is respectfully requested to reconsider and withdraw the corresponding rejections, and to pass the claims of the present application to issue, for at least the above reasons.

In the event that there are any outstanding matters remaining in the present application, please contact Andrew J. Telesz, Jr. (Reg. No. 33,581) at (571) 283-0720 in the Washington, D.C. area, to discuss these matters.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment for any additional fees that may be required, or credit any overpayment, to Deposit Account No. 50-0238.

Respectfully submitted,

VOLENTINE FRANCOS & WHITT, P.L.L.C.

A handwritten signature in black ink, appearing to read "A. J. Telesz, Jr.", followed by a checkmark.

Andrew J. Telesz, Jr.
Registration No. 33,581

One Freedom Square
11951 Freedom Drive, Suite 1260
Reston, Virginia 20190
Telephone No.: (571) 283-0270
Facsimile No.: (571) 283-0740